3-D Solid Modeling and Design

Student Learning Activities

for

PTC

Pro/DESKTOP® 8.0

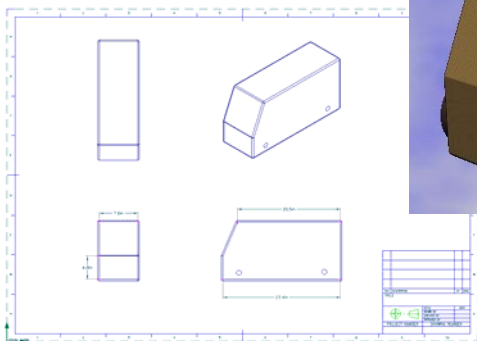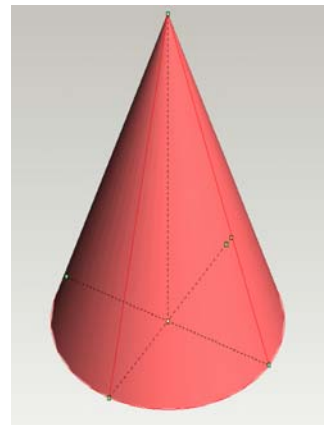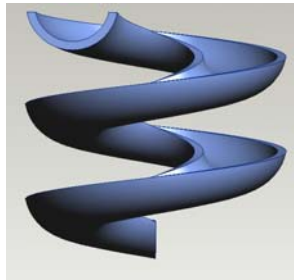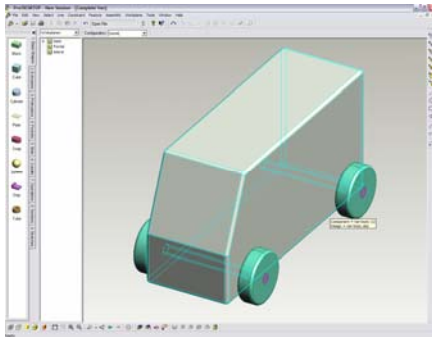*Activity #13*
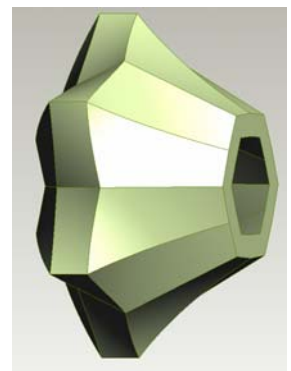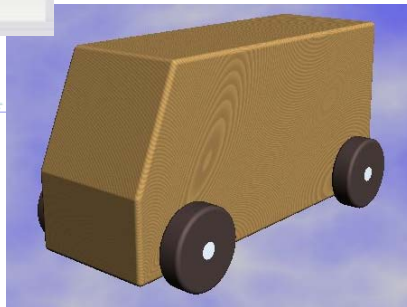
Activity 13:

Putting it all together
(Flesch-Kincaid readability level = 6.2)

About the program

Pro/Desktop (called 'PD' from now on) is a powerful software program that allows you to sketch ideas first, and then work on design details later.

This activity will help you:
> ➢ Practice using assembly commands in more depth than in Activity #6

Assembly: Adding components

In this activity, you will learn more about different designs together. **Assembly** is an important feature in PD because most designs are made as only one part of a system of parts working together. Although the assembly in this activity is quite simple, learning how to assemble separate designs will allow you to show how all the parts to a project go together toward a purpose.

Tic…..

Make a new design with the following elements: A 200 mm square, extruded 10 mm, with 4 chamfered edges of an 8 mm equal setback. Place the point of Origin at the center of the square.

**Save** your drawing as **"Board"** in the location determined by your instructor.
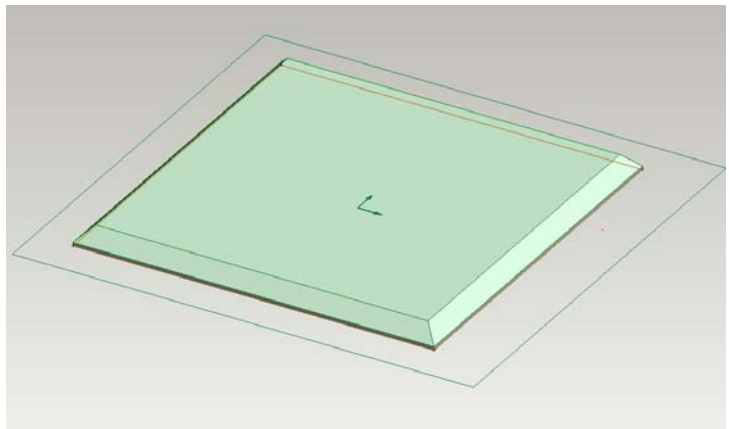
Tac…..

Now, make a design of a **lattice** (fence-like structure). Look at the lattice pictured here. You will need to copy it with the following dimensions: 50 mm square space inside each window, widths of each bar = 10 mm. The total width and height will equal 170 mm. it may be easiest to create the lattice by using a series of rectangles joined end to end, and then deleting crossing lines when the grid is completed. Place the Point of Origin in the center of the grid. Extrude by adding material 15 mm above the workplane.
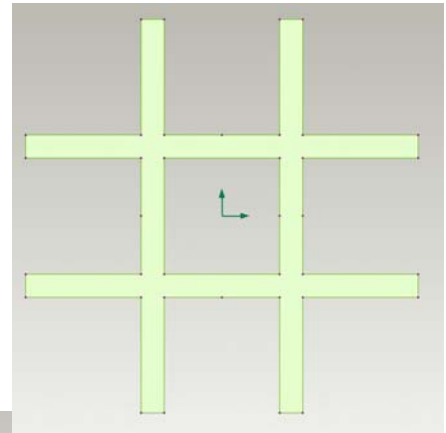
**Save** your drawing as **"Grid"** in the same folder as **"Board"**.
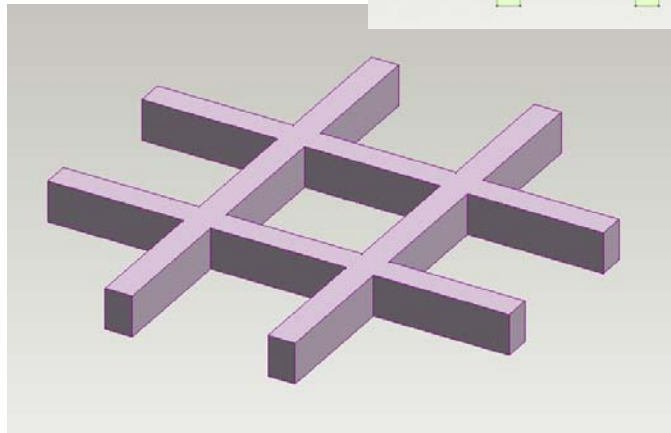
Toe…..
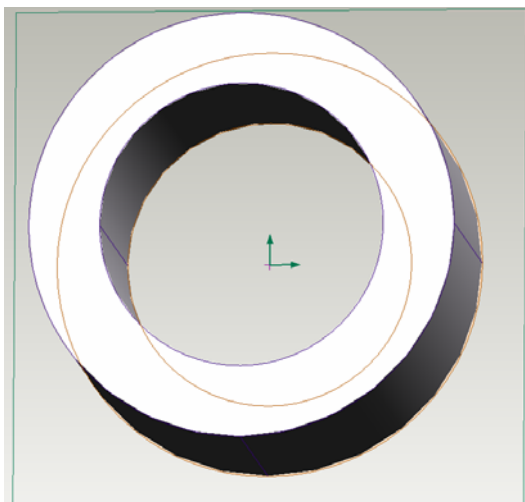
Make a ring by placing two concentric circles together. The outside Ø = 30 mm, the inside Ø = 20 mm. Extrude the ring to 20 mm above the workplane. Place the Point of Origin in the center of the ring. **Save** your drawing as **"O"** in the same folder as **"Board"**.

Now, make a 'plus sign' (+) by using rectangles and deleting lines to form a plus sign that is 10 mm wide, 30 mm from tip to tip, and extruded 20 mm above the workplane. Place the point of

origin *at a 45-degree angle in the center of the + sign.* **Save** your drawing as **"X"** in the same folder as **"Board"**.
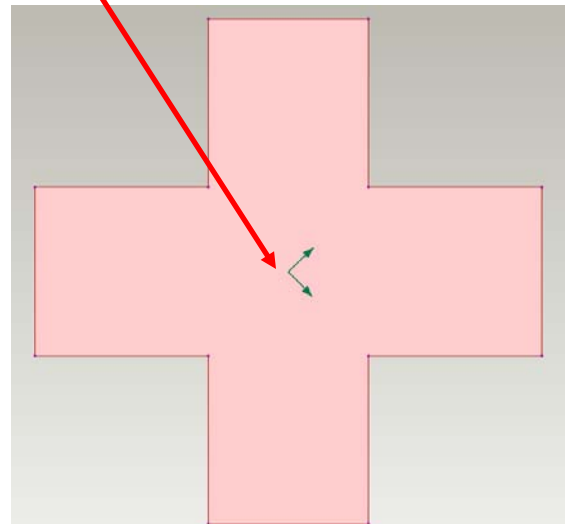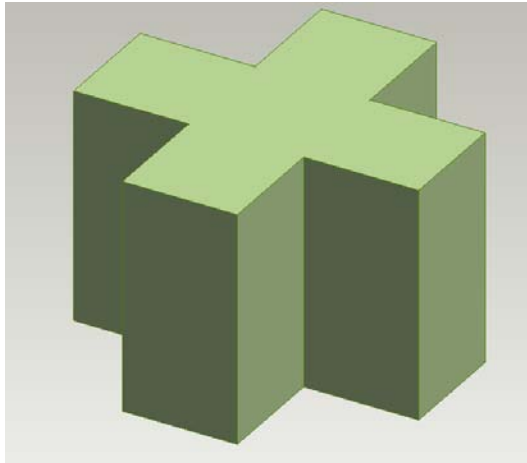

X's, or O's???

Close all files that may be open. Now, open the file named **Board**. Make sure the Point of origin is in the center of the board. Switch to the Workplane view and Autoscale to fit the Board into the window. Go to the **Assembly** pull down menu and select **Add Component**. Browse to the folder that contains all your other designs (grid, X, O). Select "Grid" and click OK. Switch to the Trimetric view. If your grid is not centered on your Board, then one or both of the Points of Origin were not centered on the designs to start with. **Save** your assembly at this point according to the directions of your instructor. Now, decide whether or not you want to be 'X's or 'O's and find a partner….
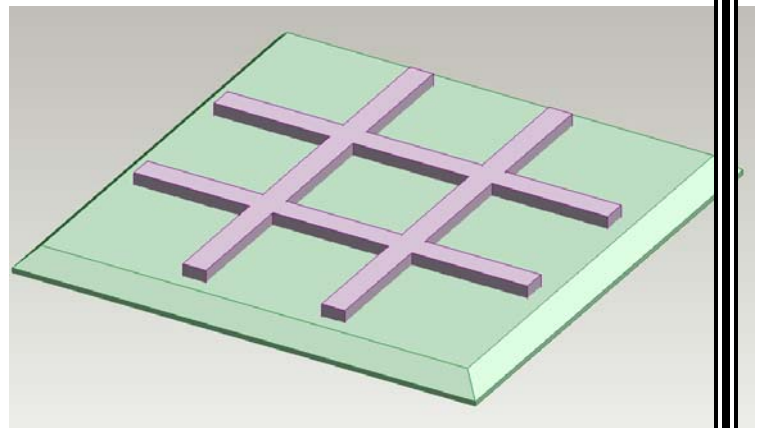

Game on!

In order to play the game and assemble the drawing until the game is won or a draw is declared, you will need to find the center of each square in the grid and place the Point of Origin in the one you want to occupy with your X or O. For example, if you want to place an O in the upper left corner square, (switch to the Workplane view to see better) you would move to coordinates (60,60) in the **Snap to Grid** reading. To do this, click on any drawing tool to activate the

workplane. Then, click on the **Workplane** pull down menu and select

reposition axes. When the Snap to Grid readout is at (60,60), click once and the Point of Origin is now relocated there. To try it our, Go to the **Assembly** pull down menu and select **Add Component**. Browse to the folder that contains all your other designs (grid, X, O). Select "O" and click OK. Switch to Trimetric for another view.
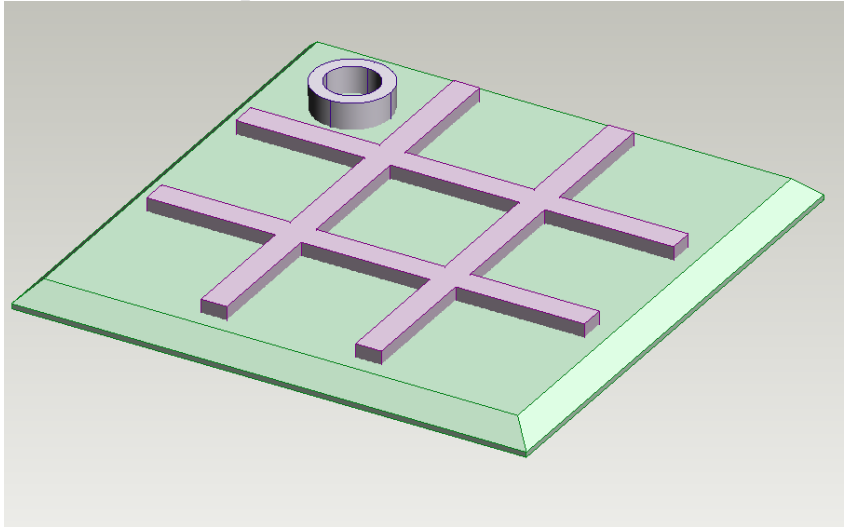
Now, it's your partner's turn. See if you can continue by finding the exact center of the *x,y* coordinates for each square, and place an "X" or an "O" in each. Also, try to win your opponent by getting three in a row…
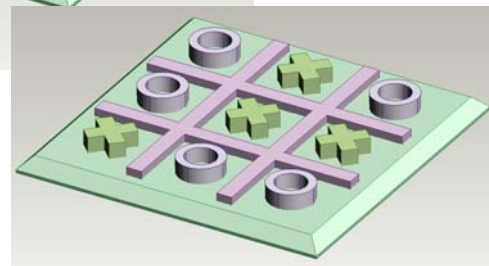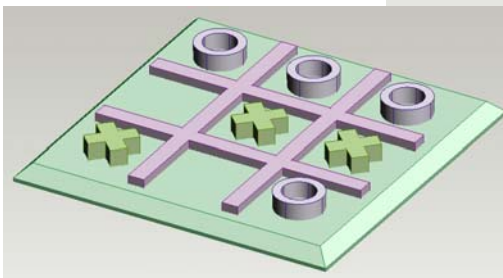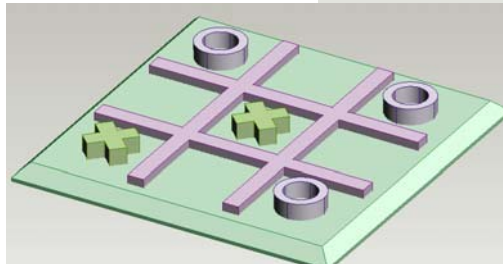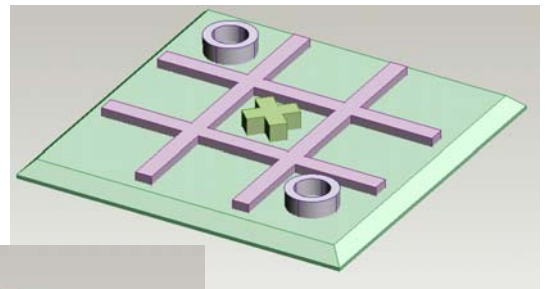
Save your drawing according to the directions of your instructor.

Assembly: Mate and Align

You may have noticed that the Tic-Tac-Toe design aligned all parts on the same workplane at the Point of Origin. The grid and X/O's were taller than the board when they were made, so they would 'stick up' through the board in order to be seen. But what if you want to glue two pieces together, rather than try to make them go through each other. Most of the time, this will be the case.

Open the **Board** file. Create a new workplane referenced to the Base workplane and name it "grid" with an offset of 50 mm.
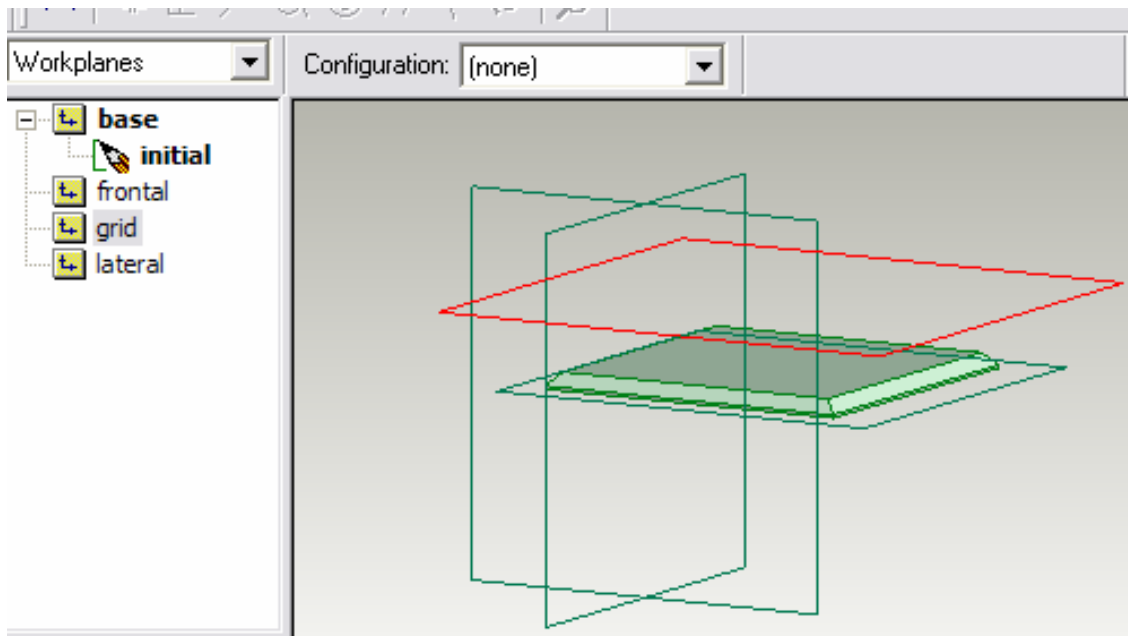
Now, create a new sketch (under the workplane pull down menu) in the grid workplane. Make sure the grid workplane is active (**red**). Name the sketch "grid". Make sure the sketch named grid is active (**bold**) in the Object Browser Pane. →
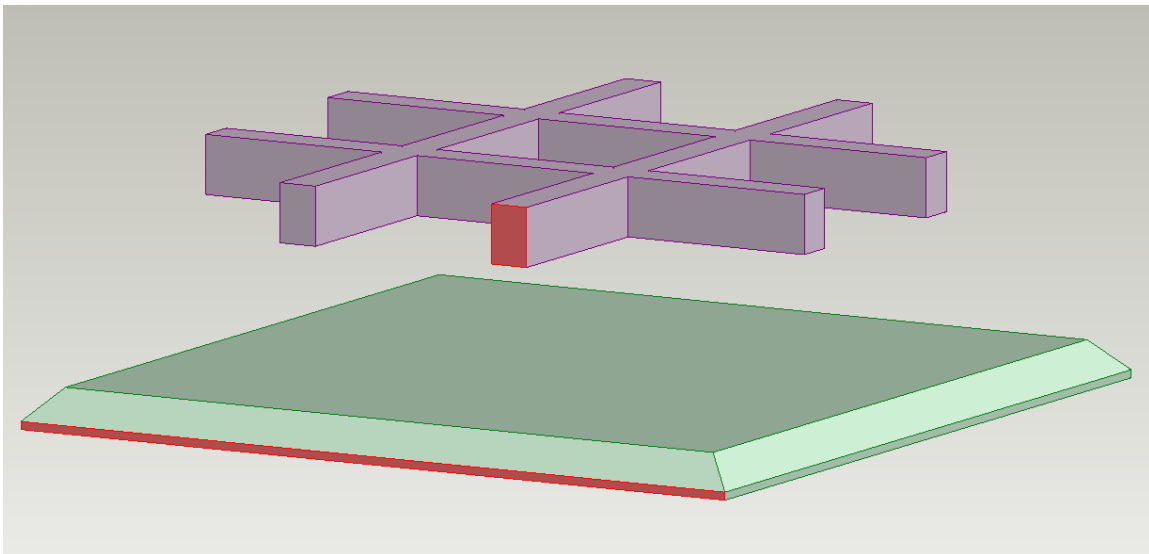

Now, go to the Assembly pull down menu and select "Add Component". Locate your file named "Grid" and click OK. Notice that the grid is centered with the Point of Origin of the board, but that it is 50 mm higher than the base plane.
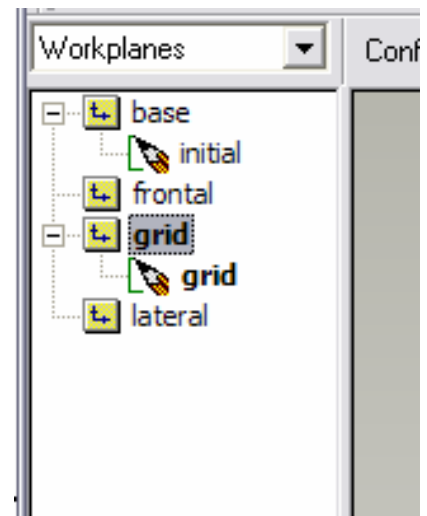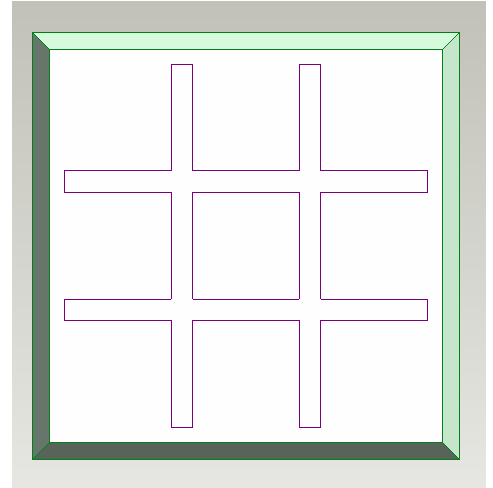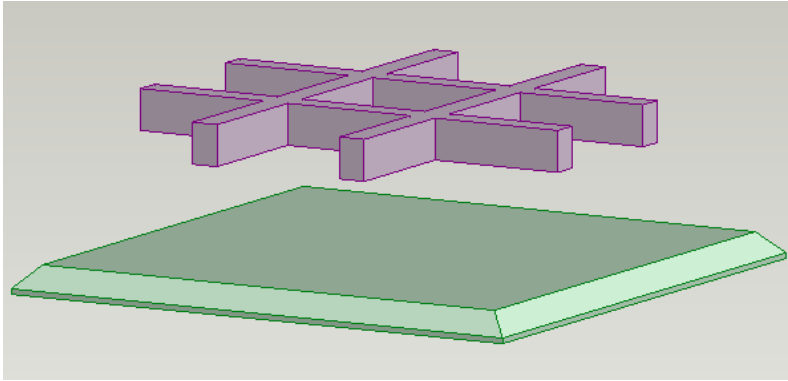
Switch to the Workplane view to see what the two pieces look like from that angle, then switch back to the trimetric view.

Suppose you wanted to line up the edge of the grid with an edge of the board. This is done by using the **align** command under the Assembly pull down menu. To line up, or align edges of different designs, you must first select the edges to align. Click on the Select Faces icon. **While holding down the Shift key**, click on one side of the grid and on the edge of the board so that they become active (**red**).

With both faces active, go to the Assembly pull down menu and select **Align**. Switch to a side view to see the result.
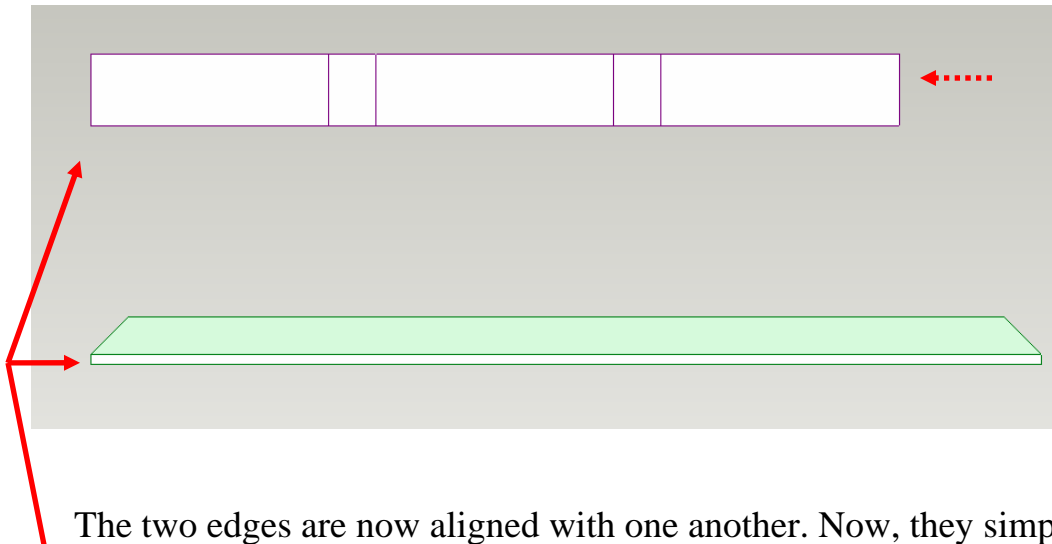
The two edges are now aligned with one another. Now, they simply need to be 'glued' or **mated** together. Switch back to the trimetric view. Again, you will select two faces (as shown below). Select the top of the board and the bottom of the grid.
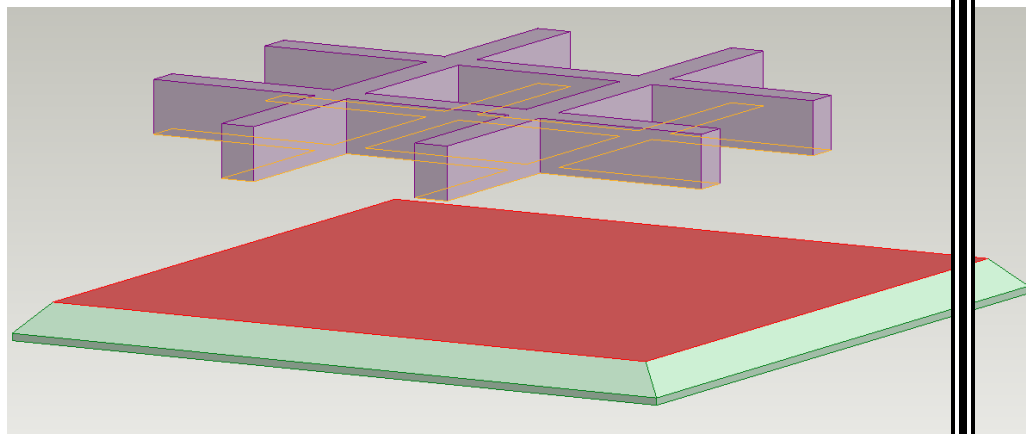
This time, select **Mate** from the Assembly pull down menu. The pieces are glued or mated together.

You do not need to save this design.

You have completed this activity using PD! Please exit the program.